

Robust Analysis and Prediction for Integrated Design of Structures (RAPIDS), Phase I

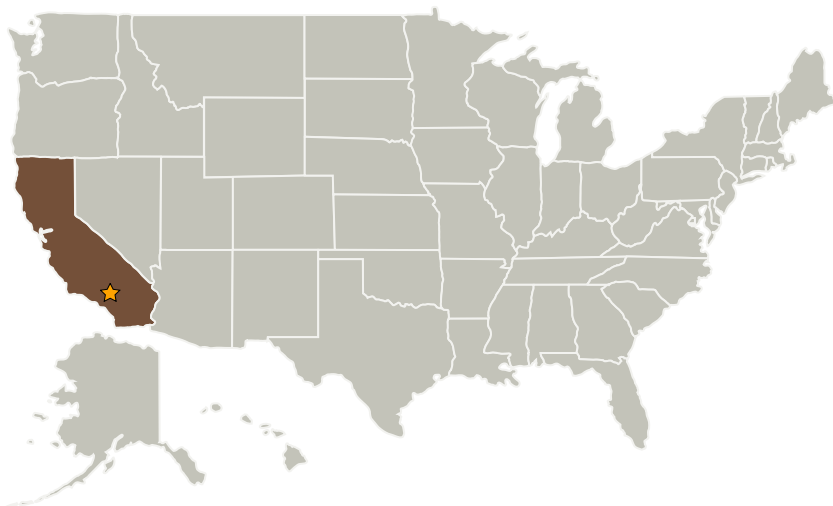
Completed Technology Project (2004 - 2005)



Project Introduction

Commercially available software suites such as the Automate Structural Optimization System (ASTROS) and MSC/NASTRAN represent the current industry standard in multidisciplinary design and optimization (MDO) tools. The primary capabilities of these products have remained largely unchanged since their initial release. In the analysis and design of modern aerospace vehicles, the deficiencies of these legacy tools are becoming increasingly clear. The linear aerodynamic methods employed by these tools are not appropriate when transonic flight regimes are considered or when other nonlinearities are present, particularly when these techniques are used to predict flight vehicle performance. Although advances in computational power and numerical techniques present an opportunity to employ higher fidelity methods, the development of new software is proceeding slowly. The effort described in this Phase I proposal describes a means by which nonlinear analytic and experimental data can be used to improve the accuracy of flight vehicle performance predictions by utilizing existing analysis tools. A procedure is presented to integrate a finite element based analysis and design tool with a nonlinear aerodynamic solver and graphical visualization system to provide improved correlation of simulated results with flight test data.

Primary U.S. Work Locations and Key Partners



Robust Analysis and Prediction
for Integrated Design of
Structures (RAPIDS), Phase I

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission
Directorate (STMD)

Lead Center / Facility:

Armstrong Flight Research
Center (AFRC)

Responsible Program:

Small Business Innovation
Research/Small Business Tech
Transfer

Robust Analysis and Prediction for Integrated Design of Structures (RAPIDS), Phase I

Completed Technology Project (2004 - 2005)



Organizations Performing Work	Role	Type	Location
★ Armstrong Flight Research Center (AFRC)	Lead Organization	NASA Center	Edwards, California
NextGen Aeronautics, Inc.	Supporting Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Torrance, California

Primary U.S. Work Locations

California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.3 Aeroelasticity